Water

P.E.I.'s MOST PRECIOUS RESOURCE
BRACKLEY - COVEHEAD BAYS COMPLEX

WATERSHED ACTIVITIES

SURFACE WATER PROGRAM

MARCH 1990

THE CANADA–PRINCE EDWARD ISLAND
WATER MANAGEMENT AGREEMENT

Environment Canada Environnement Canada

Prince Edward Island
Department of the Environment

BRACKLEY - COVEHEAD BAYS COMPLEX

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THE CANADA — PRINCE EDWARD ISLAND
WATER MANAGEMENT AGREEMENT

Prepared by:

Environment Canada
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P.E.I. Department of the Environment
Fish and Wildlife Branch

SURFACE WATER PROGRAM

MARCH 1990

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PREFACE

This report is one of a series produced as a result of the Canada - Prince Edward Island Water Management Agreement. The work was performed as part of the Watershed Inventory Project under the Surface Water Program.

It was initiated in order to gain a better understanding of the activities which may impact on the quality and quantity of surface waters which drain into Brackley Bay and Covehead Bay.

The report is intended to be used in conjunction with the report entitled "Activities Affecting Surface Water Resources · A General Overview" and the book of "Brackley - Covehead Bays Watershed Complex Inventory Maps" which is maintained on file at Inland Waters Directorate, Environment Canada in Dartmouth, Nova Scotia. All references to maps in this report refer to the atlas.

Mapping was performed on the 1:50,000 N.T.S. topographical series using the Universal Transverse Mercator (U.T.M.) grid system to the nearest one hundred (100) metres for point data. Non-point (polygon) data was also mapped where applicable. This mapping technique is easily transferable to the Geographical Information System (G.I.S.) which can provide for updates and manipulation of the data.

ACKNOWLEDGEMENTS

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1.0 INTRODUCTION

In November 1987, the Canada - Prince Edward Island Water Management Agreement was signed. The Agreement focusses upon several areas including groundwater contamination, surface water degradation and estuarine eutrophication. Of these, the Watershed Inventory Project, as part of the Surface Water Program, has been designed to identify current and future users of surface water and to document resource conflicts within twelve watersheds across the province. The Brackley - Covehead Bays Watershed Complex (Figure 1.1) was identified as an area of study for the project.

2.0 GENERAL CHARACTERISTICS OF THE BRACKLEY - COVEHEAD BAYS WATERSHED COMPLEX

2.1 Physiography

The Brackley - Covehead Bays Watershed Complex is located in the north central section of Queens County, P.E.I. Black River and McCallum Creek both empty into Brackley Bay while Bells, Auld and Parsons Creeks all drain into Covehead Bay. Brackley Bay opens to Covehead Bay which then drains via a small outlet into the Gulf of St. Lawrence which is located on the north side of the Island.

The several glaciers which at one time covered Prince Edward Island have caused a gently undulating terrain across much of the province. Average elevation is less than sixty-one (61) metres above sea level. The watershed encompasses a moderately steep section of the Island. Elevations range from sea level in the northern sections to about sixty-one (61) metres in the most southerly sections.

The area is largely rural with small towns and a scattering of farms. However, as Charlottetown expands, more and more development ranging from light industrial to subdivision establishment is occurring within the southern areas of the watershed. The watershed is busy during the tourist season which, aside from the spring and autumn shoulder seasons, extends from the beginning of July to the end of August. The northern sections, especially, are oriented towards the tourist industry with a large number of cottages and other recreational facilities in the area.

The watershed is fairly small and drains a landbase of about eighty-one square kilometres (80.98 km^2). The length of the four major surface waterways and their tributaries is approximately forty-three kilometres (43.47 km). A physiographic comparison with the province (Figure 2.1) reveals that the watershed has a lesser percentage of land devoted to forests but only a slightly higher percentage is cleared

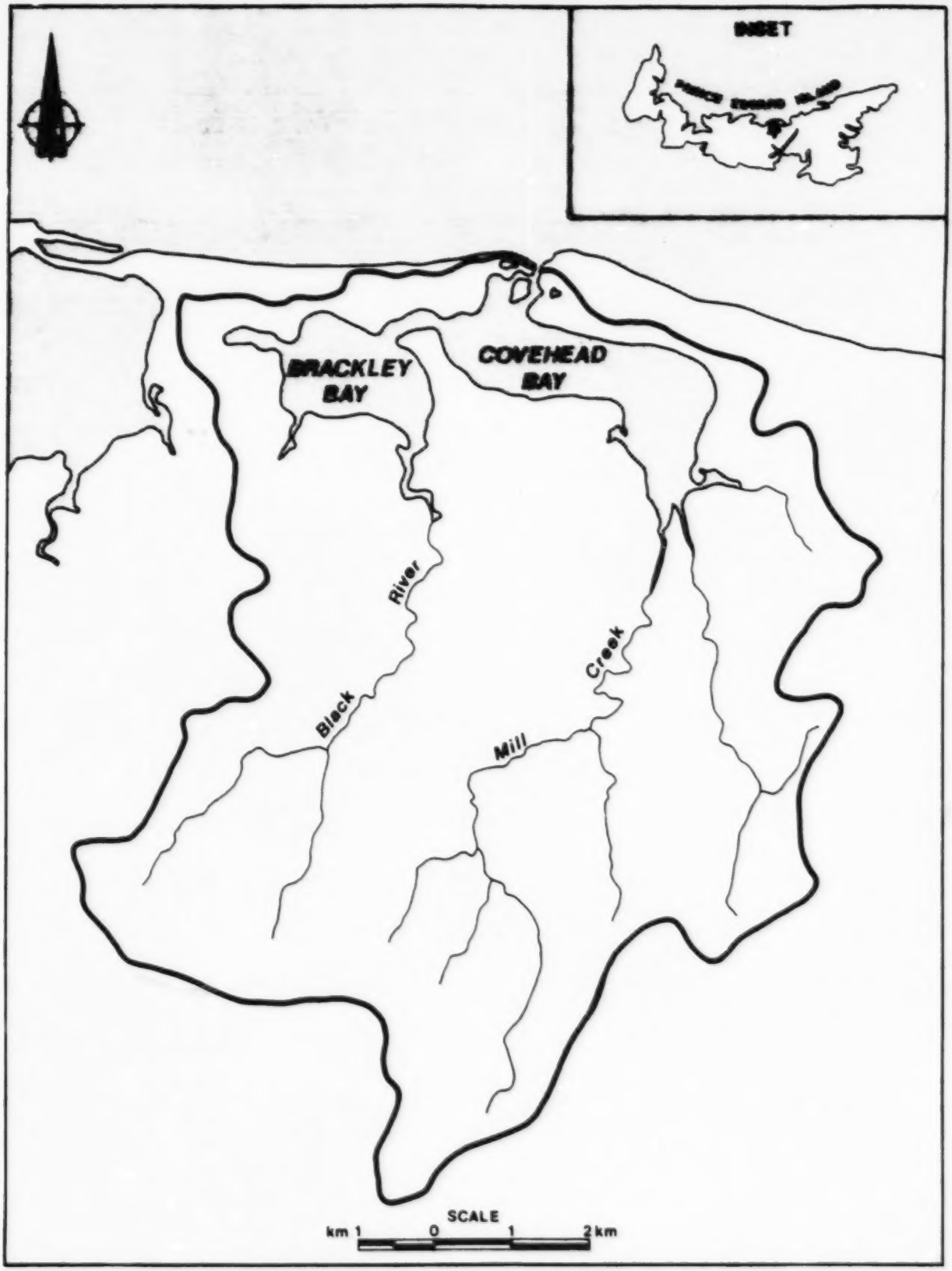
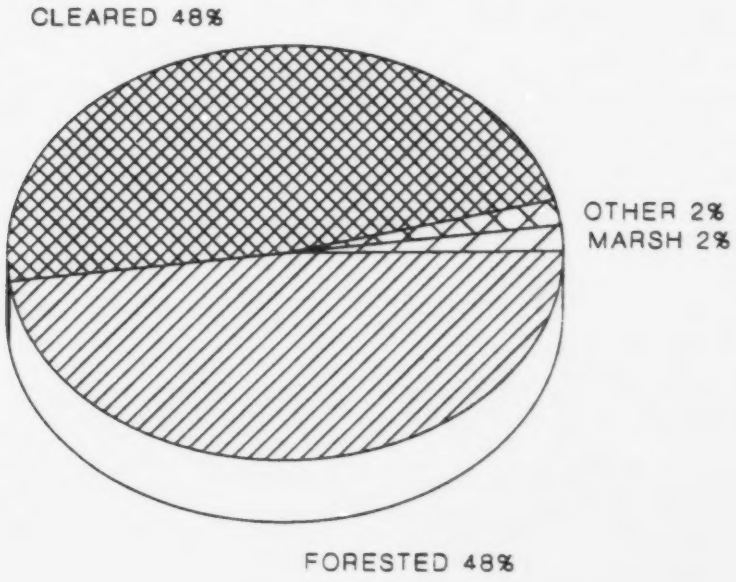


Figure 1.1 Brackley — Covehead Bays Watershed Complex

PRINCE EDWARD ISLAND



BRACKLEY - COVEHEAD BAYS WATERSHED

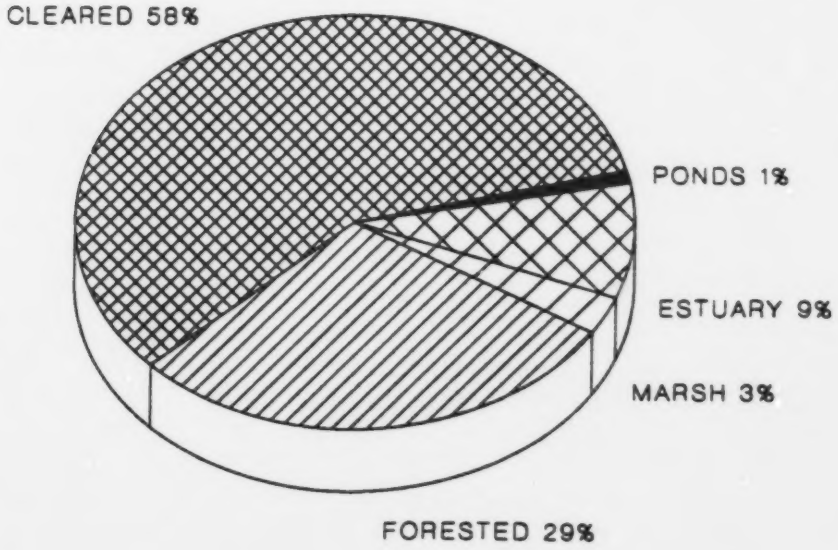


Figure 2.1 Physiographic Comparison Between Prince Edward Island and the Brackley — Covehead Bays Watershed Complex

(Taylor, 1989). The difference lies in the fact that fourteen percent (14%) of the watershed is made up of estuaries, marshes and ponds, whereas only four percent (4%) of the province falls into this category.

2.2 Soils

Prince Edward Island's podzol soils, formed mainly from the weathering of sandstone and the deposition of glacial till, are generally stone-free, sandy and permeable. The Brackley - Covehead Bays Watershed Complex is composed of varying amounts of Class 2S, 3S, 3T, 4S, $4^{T}s$, $5^{S}w$, 7I and 7S soils. Approximately forty-five percent (45%) of the soils are Class 2, twenty-five percent (25%) Class 3, ten percent (10%) Class 4, fifteen percent (15%) Class 5 and five percent (5%) Class 7 (Canada Land Inventory, 1968).

3.0 AGRICULTURAL OPERATIONS

Agriculture forms a major part of Prince Edward Island's economy. Many parts of the watershed's terrain are used for raising livestock. There are a total of twenty-one (21) major livestock operations located throughout the area (Map 11L/6). Crop production is also evident with the following being grown on a limited scale; potatoes, turnips, carrots, hay, oats, barley and clover.

3.1 Dairy Operations

There are four major dairy operations located in the watershed (Figure 3.1) containing at least thirty (30) or more head (30 milkers and 30 feeders) of cattle (Dickieson, 1989).

3.2 Beef Operations

Two large beef cattle operations (Figure 3.1) with fifty (50) or more head (50 cattle plus 50 feeders) are present (Murphy, S., 1989).

3.3 Hog Operations

Twelve hog operations (Figure 3.1) are located within the boundaries of the watershed. Each has an annual production of eight hundred (800) or more animals (Johnson, 1989). Since hogs are normally housed indoors the only threats to surface water quality are as a result of the improper storage and disposal of manure.

3.4 Poultry Operations

Three large scale poultry operations (Figure 3.1) are also

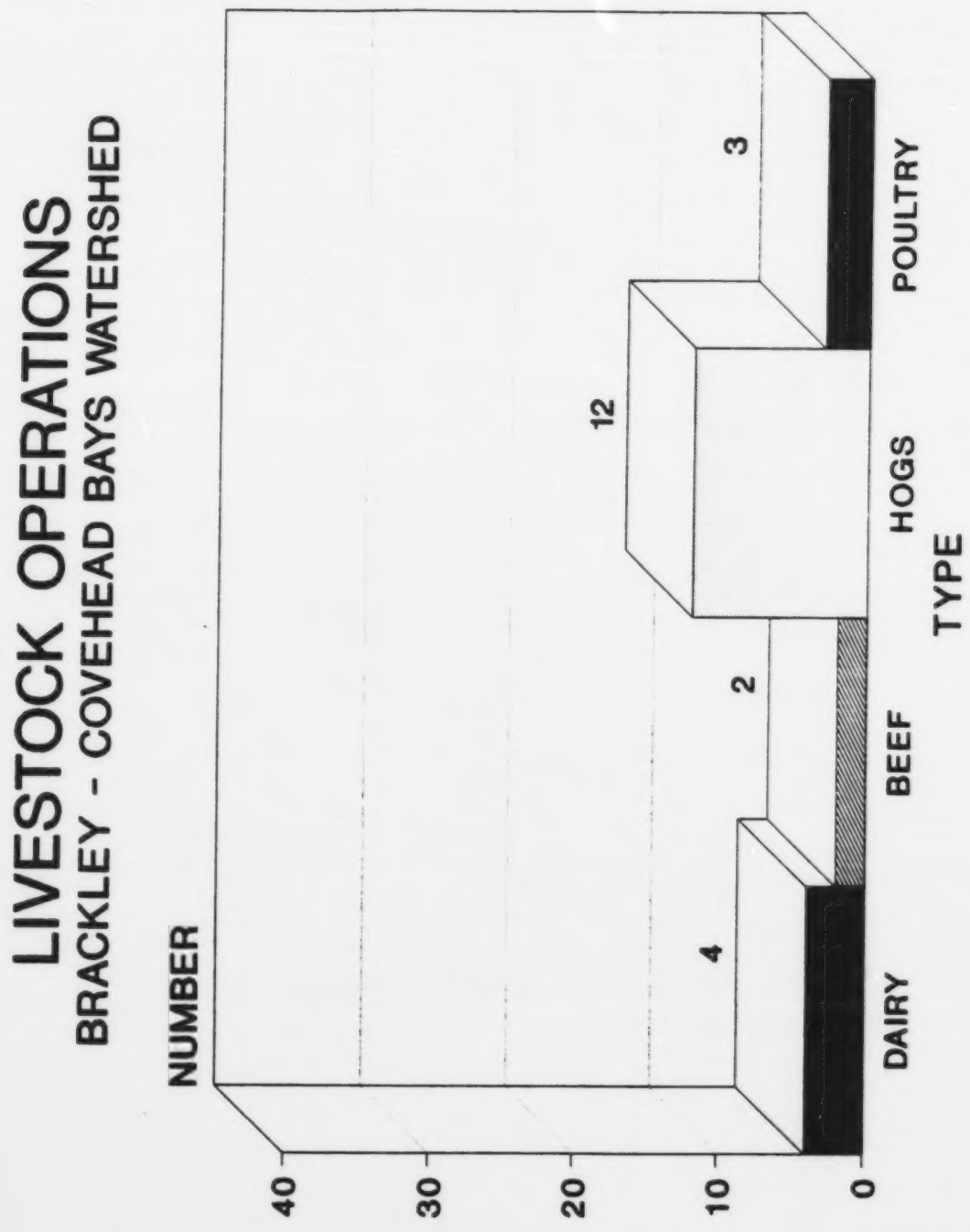


Figure 3.1 Livestock Operations Located Within the Brackley — Covehead Bays Watershed Complex

located in the watershed (Newson, 1989).

3.5 Stock Watering

Most livestock on Prince Edward Island are watered using groundwater piped into troughs (Murphy, S., 1988). However, there have been some instances noted in which animals were observed drinking from streams traversing pastures (refer to Section 11.2). This leads not only to destabilization of the stream banks and siltation but also to bacterial contamination of the water.

3.6 Irrigation

The Prince Edward Island Department of Agriculture does not keep specific records on irrigation occurring within the province. Water used for irrigation generally comes from a surface water source such as a farm pond or stream. In unusually dry years there are more farmers than usual who have to irrigate their crops (Clough, 1988). A farmer was noted to withdraw water from Bells Creek (Map 11L/6) to irrigate his turnip crop during the fairly dry growing season of 1989. This practice may affect the amount of water available for users in downstream locations. Therefore, a system should be in place which will monitor the resource.

3.7 Dead Stock Burial

There are not any dead stock burial sites in the watershed. Farmers can either pay a service fee to have their stock discarded at an approved disposal site or they can sell their dead animals to Maritime Pet Foods both of which are outside of the watershed. They can also dispose of the carcasses on their own land (which is the most likely scenario).

3.8 Erosion Control Projects

There are not any erosion control projects in the Brackley - Covehead Bays Watershed Complex (Pharo, 1989).

4.0 FISH AND WILDLIFE RESOURCES

Fish and wildlife resources are important to both residents and tourists alike on Prince Edward Island in terms of the recreational and economic benefits they provide. Fish and wildlife on P.E.I. are dependent upon surface water resources either for primary habitat or as a source of drinking water.

4.1 Angling Areas

There are a number of angling sites along the rivers (Map

11L/6) including two listed in Angling on Prince Edward Island (P.E.I. Department of Tourism and Parks, 1988). These areas are Cass Pond and Marshalls Pond, which are located on Bells Creek and Auld Creek, respectively.

4.2 Hunting Areas

Most of the hunting activity is concentrated near the perimeters of Brackley Bay and Covehead Bay (Map 11L/6). The fields of food crops, especially grain, provide an abundant supply of food for waterfowl during their spring and fall migrations. As well, the numerous woodlots and hedgerows separating the agricultural fields provide suitable habitat for such upland game species as; pheasant, snowshoe hare, ruffed grouse, Hungarian partridge, snipe and woodcock (Hurry, 1989). Since wildlife is known to be migratory, in response to habitat requirements and food availability, their boundaries are not static from year-to-year.

4.3 Trapping Areas

The trapping areas in the watershed also do not have consistent boundaries from year-to-year. They are dependent both upon the movement of animals and the preferences of trappers. Some of the species trapped include muskrat, beaver, mink and snowshoe hare. Trapper use of the area is related to the fur market conditions during the season. Trapping occurs almost exclusively adjacent to both Black and Bells Creek for most of their lengths (Map 11L/6), (Hurry, 1989).

4.4 Beaver Activity Areas

Beaver dams in streams and rivers result in the creation of flowages. These new areas provide habitat for waterfowl other other furbearing mammals such as mink and muskrat. The effects of beaver dams and the resulting flowages can also be viewed negatively as they often block the passage of trout, salmon and other finfish to essential spawning and feeding areas. There are not any active beaver dams in the watershed.

5.0 RECREATIONAL ACTIVITIES

Surface water and some recreational activities go hand-in-hand (swimming and boating). Other activities (hiking and skiing) are often enjoyed in close proximity to streams and rivers. Similarly, major recreational facilities (provincial parks and campgrounds) are generally situated adjacent to Island surface water resources.

5.1 Provincial Parks / Private Campgrounds

As mentioned previously the watershed is a high-use area

for tourists. The proximities of Prince Edward Island National Park and Charlottetown make tourism-related developments in the Brackley - Covehead area very popular. Although P.E.I. National Park mostly skirts the watershed on its northern boundary and there are not any provincial parks located within the watershed, many private camping operations do exist. Eight campgrounds containing almost seven hundred (684) sites are in operation (Map 11L/6). Three have sewage dumping stations while all have flush toilets and showers.

There are eighty (80) units available in motels, cottages and tourist homes (bed and breakfast) in addition to the private campgrounds. Several offer recreational activities such as boating, trail riding, swimming and windsurfing (P.E.I. Department of Tourism and Parks, 1989).

5.2 Swimming Areas

Generally, people will swim where they desire. In P.E.I. many of the best swimming areas are coastal. This excludes much of the Brackley - Covehead Bays Watershed Complex.

The only organized swimming activities on the Island occur through the Canadian Red Cross Society which organizes swimming events mainly in the eastern end of the Island. There may be occasional out-trips in other areas of the province. These fairly rare events are used to train summer staff (MacLean, 1989).

Brackley Bay and Covehead Bay are both ideal for swimming as they are fairly shallow and sheltered. Ponds, areas near bridges and the wider sections of the Rivers would also be popular areas for swimming. P.E.I. National Park contains extensive coastal beaches which are ideal swimming locations.

5.3 Boating / Canoeing Areas

The Prince Edward Island Recreational Canoeing Association (PEIRCA) is able to provide information on various canoeing routes throughout the province but does not offer any organized trips (P.E.I. Department of Tourism and Parks, n.d.). The presence of dams and several road-stream intersections make the small rivers and creeks not well-suited for canoeing. However, PEIRCA recommends both Brackley Bay and Covehead Bay as good areas for canoeing. Access points to the Bays include; the golf course at Stanhope, anywhere along the Covehead Bay Road, a bridge on Route #15, Vacationland Campground and the launching ramp on the west side of Covehead Bridge (Map 11L/6).

Boardsailing is gaining popularity on P.E.I. Brackley Bay and Covehead Bay are large and fairly sheltered and provide

most of the windsurfing opportunities.

5.4 Hiking / Cross-Country Skiing / Snowshoeing

For the nature-buff or recreational enthusiast, a good method in which to see an area is on foot, either by hiking, cross-country skiing or snowshoeing. In this way, people can go at their own pace, perhaps photographing what catches their eye or just enjoying the great outdoors.

There are no organized hiking or cross-country trails although the several unpaved roads and woods' roads are well-suited for this purpose.

Snowshoeing may be undertaken anywhere although the areas utilized for hiking and cross-country skiing most likely have the highest use for snowshoers as well.

5.5 Snowmobiling / Horseback Riding

There are not any snowmobiling clubs located within the Brackley - Covehead Bays Watershed Complex and therefore, no organized excursions. Snowmobilers are often observed riding through fields and along woods' and seasonal roads.

There is one commercial horseback riding operation located within the watershed. Millstream Trail Rides offers one hour horseback rides along a pond, McCallum Creek and through woods and fields (Map 11L/6).

5.6 Unplowed (Seasonal / Scenic Heritage) Roads

Several roads are not open for vehicular traffic during the winter months (Map 11L/6). Their relative abundance provides additional locales for winter recreational activities such as cross-country skiing, snowshoeing and snowmobiling. Often not well travelled, even during the warmer months, these roads may further supply recreational opportunities for hiking, cycling and horseback riding.

Several roads across the Island have been designated as Scenic Heritage roads as a result of their natural and historical significance. There have not been any roads so designated within the Brackley - Covehead Bays Watershed Complex (Horne et. al., 1988).

6.0 FISHERIES OPERATIONS

The fishing industry is very important to the economy of Prince Edward Island. All of the province's major watersheds have an estuarial component which supports a fishery to some

extent. The value of the fish and shellfish species landed within the Brackley - Covehead Bays Watershed Complex during 1987 was just over ten thousand dollars ($10,397), (Figure 6.1). All finfish and shellfish harvesting can be placed into three general categories, namely; licensed commercial, non-licensed commercial and recreational and finfish aquaculture.

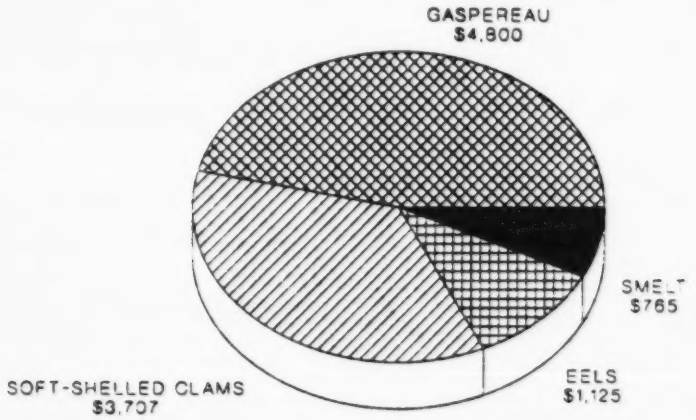


Figure 6.1 1987 Fish/Shellfish Landings Within the Brackley — Covehead Bays Watershed Complex

6.1 Licensed Commercial

Most areas of the Brackley - Covehead Bays Watershed Complex are classed as public fishing domain. As such, there are no suspended or ground shellfish leases and any fisherman can remove shellfish in season. Other areas are specific leased areas or zones and can be fished only by the lease owner. There are eight oyster leases and one mussel lease within the watershed (Map 11L/6), (Small, 1989).

Soft-shelled clams are harvested in both Brackley Bay and Covehead Bay on a commercial and non-commercial basis. Shellfish concentrations within the watershed have been identified by Department of Fisheries and Oceans personnel (Map 11L/6).

The Brackley - Covehead Bays Complex is open to eel netting annually from August 15 to November 30. The system is open to eel spearing on a year round basis. Smelt catches are regulated by season and are monitored by Department of Fisheries and Oceans staff. Box, gill and bag nets are used to trap smelt during the annual season (October to February). (McInnis, 1989).

6.2 Non-Licensed Commercial / Recreational

Trout and smelt are harvested in season on a recreational

basis. Quahogs, clams and mussels are also harvested from public areas.

Despite the closure of sections of the Bays and estuaries as a result of bacterial contamination on a seasonal and permanent basis (Map 11L/6) the watershed supports non-licensed commercial as well as recreational finfish and shellfish harvests. Any shellfish which are removed from the contaminated areas, must be transferred to unpolluted areas for flushing (a period of three to four weeks). However, people who harvest shellfish from contaminated areas must first obtain a conditional permit from the Department of Fisheries and Oceans.

6.3 Aquaculture Operations

There are two shellfish or finfish aquaculture sites located within the Brackley - Covehead Bays Watershed Complex aside from the oyster and mussel leases which were mentioned previously (Murphy, L., 1989).

7.0 INDUSTRIAL OPERATIONS

Many of the industrial operations located on Prince Edward Island have an effect on surface water resources in one way or another. Some discharge both treated and untreated wastes directly into streams and rivers while others allow for the seepage of pollutants to surface or groundwater sources. Some industrial operations require a surface water or groundwater source for use in their processes.

7.1 Stormwater Drainage

There are not any areas within the Brackley - Covehead Bays Watershed Complex which are built up to the extent that stormwater drainage systems are required to treat rain or spring runoff (Quick, 1989).

7.2 Sewage Lagoons

There are not any sewage holding lagoons or treatment plants. The relatively small size of the communities located restricts the need for such facilities. The residential sewage is treated via private septic sytems (Quick, 1989).

7.3 Food and Beverage Processors

There are several potato and vegetable washing and packing operations in the watershed but their effects on the quality and quantity of the surface waters are minimal (Quick, 1989).

7.4 Abandoned, Active and Unapproved Dump Sites

During 1982-83, the P.E.I. Department of Community and Cultural Affairs, in conjunction with Environment Canada, performed a study in which abandoned, active and unapproved waste disposal sites on Prince Edward Island were located and inspected (Water Resources Section, 1983). Of prime concern during this inventory was the potential for groundwater contamination. Three sites were identified within the Brackley - Covehead Bays Watershed Complex (Map 11L/6).

As part of the inventory a scoring system was used to rate and priorize (Priority I, II and III) each site on the basis of actual and potential environmental effects. Priority I sites were rated as being most hazardous to the environment; Priority II dumps were less hazardous; while Priority III sites were generally very small discriminate sites which were not considered to be environmentally hazardous. Evaluation determined the three to be Priority III dumps.

The Air and Solid Wastes Branch of the P.E.I. Department of the Environment does not operate any dumps within the watershed (Curley, 1989).

There is not an established program for hazardous waste disposal on Prince Edward Island (Curley, 1988). However, the Air and Solid Wastes Branch cooperates with their federal counterparts in controlling toxic waste disposal. For example, asbestos, which has been removed from buildings is double-bagged and dumped at landfill sites. Agricultural pesticides are sometimes left at dumpsites illegally. Since it is difficult to regulate such practices, remnant chemicals could become a potential hazard to both surface and groundwater resources.

The only other major form of toxic wastes on P.E.I. are polychlorinated biphenols (PCB's). As these compounds do not break down under normal conditions, they must be stored until they can be transported to a proper disposal site (located off-Island). There are not any registered PCB users or PCB storage sites in the watershed (Guardian - Patriot, 1988). Hazardous materials are not generated in significant amounts to threaten its surface water resources.

7.5 Excavation Pits

Scattered throughout Prince Edward Island are numerous excavation pits used for the private and commercial removal of sandstone, and to lesser amounts, gravel and sand. Three registered active excavation pits (Map 11L/6) are found in the

watershed (Eaton, 1989). Records are not kept concerning the quantity of material removed from the individual pits and there are other pits for which permits have not been obtained. As well, records are not maintained concerning the number of non-operational or abandoned pits within the watershed (Murphy,C., 1989).

7.6 Salt / Sand Storage Locations

The P.E.I. Department of Transportation and Public Works maintains a number of salt/sand storage areas across the Island. At these temporary sites, the salt and sand is stored directly on the ground with little or no site preparation. Often, the locations of these secondary sites change thereby yielding both abandoned and active sites. There are not any active salt/sand storage sites in the area.

7.7 Snow Disposal Sites

Since most of the communities are fairly small there are not any major problems with snow accumulation on the roads (Quick, 1989). Snow is plowed either into the ditch or the nearest open field or lot. Therefore, the effects of this activity on surface water resources are minimal.

8.0 ALTERATIONS OF NATURAL FEATURES OF WATERWAYS

Individuals or groups wishing to alter a water system directly or indirectly to improve its recreational potential, provide a reservoir for agricultural purposes or fire protection or construct a stream crossing must seek approval from the Water Resources Branch of the P.E.I. Department of the Environment (Environmental Protection Act, Sections 10 and 11).

8.1 Application Process and Requirements

Alteration applications are subject to government control under the P.E.I. Environmental Protection Act (Section 10) and the Canada Fisheries Act (Chapter F-14, Section 20). Before requests are given final approval by the Head of the Watercourse Alteration Advisory Committee, they are reviewed by several Federal/Provincial Government and private agencies. Once approval is granted, inspections are carried out to ensure that the recommendations of the Committee are being followed.

Application considerations include the following criteria: the well-being of the fisheries resource; possible changes in water quality; stream-side cutting leading to loss of essential food and cover for wildlife; and the effects of the alteration on other types of wildlife.

Types of alterations include; installation of dams and/or fishways, bypass pond construction, roadway culvert installation, rock gabion installation and the infilling of marshes. Infilling applications, most often, are rejected since the practice results in a loss of wildlife habitat.

Since P.E.I. soils are highly susceptible to erosion, proponents who alter waterways must undertake erosion control measures throughout the construction process.

8.2 Dam Inspections

Most of the twelve dams in the Brackley - Covehead Bays Watershed Complex were inspected during the Watershed Inventory Project (Map 11L/6). Descriptions of the dams can be found in Appendix A. Some were found to constitute a total barrier to fish passage due to their design, breaching and breakdown of the structures or debris within the waterways (refer to section 11.3).

There are, often repairs made to the design flaws of roadway culverts which then permit the passage of fish through the structures. This involves the installation of baffles or back flow devices which then allows for decreased water velocities and increased depth within the culverts.

8.3 Fishways

On Prince Edward Island, whenever an alteration is made to a waterway, the continued passage of fish must be ensured [Canada Fisheries Act, Chapter F-14, Section 20, (1)]. This involves, in some cases, the construction of a fishway. Various fishway designs are available with the type constructed dependent upon the species of fish to be passed and the water level fluctuations within the impoundment.

One fishway was identified and field checked within the Brackley - Covehead Bays Watershed Complex. The six step pool and weir fishway, located at Cass Pond (Map 11L/6), was noted to be in good condition.

8.4 Road - Stream Intersections

The P.E.I. Department of Transportation and Public Works maintains a reference map which provides an up-to-date record of all major highway structures, that is, those over 1.2 metres in diameter, within the province. The Brackley - Covehead Bays Watershed Complex contains eighteen (18) such structures (Map 11L/6).

The Watershed Inventory Project also identified three additional road-stream intersections which are not kept on file

at the Department of Transportation and Public Works (Map 11L/6). These areas were located via 1:50,000 N.T.S. maps.

8.5 Rail - Stream Intersections

Earlier this century, railroads on Prince Edward Island were a vital component in the transportation of goods across the Island. However, due to increased rail costs and more efficient trucking methods, its importance is rapidly decreasing. Therefore all lines across the province were abandoned effective January 1990.

After a line is abandoned, CN Real Estate contracts out for the removal of the ties and rails. Crossing structures are not usually removed since they are often more useful if left in place.

There are not any rail lines located within the boundaries of the Brackley - Covehead Bays Watershed Complex.

9.0 WETLANDS

Wetlands include salt marshes, intertidal flats, bogs, freshwater marshes, swamps and ponds. They are important for many reasons (Canadian Wildlife Service, n.d.):

1. as wildlife habitat;
2. act as natural filters;
3. bind pollutants thereby slowing the eutrophication process;
4. reduce flooding by acting as reservoirs; and
5. recharge the groundwater supplies.

During 1983 - 84 any wetlands over 0.25 hectares on Prince Edward Island were inventoried. The objective of the program was to provide information on the classification, size, distribution and wildlife value of P.E.I. wetlands.

9.1 Freshwater Wetlands

All freshwater wetlands within Prince Edward Island were identified during the inventory and were given a wildlife value based on a wide array of parameters. The wetlands received a score between 36 and 108 with a score of 60+ indicating generally more productive areas.

Seventeen (17) freshwater wetlands with a score of 60+ were delineated in the watershed (Map 11L/6), (Canadian Wildlife Service, n.d.).

9.2 Coastal Wetlands

Coastal wetlands were classified and scored as coastal units during the wetland inventory. The coastal unit score was calculated using the total of the scores from six component types of wetlands along with five additional factors. Added to that was a value for the disturbance status of the unit. The total coastal unit score indicated its productivity and provides a measure of its importance to wildlife. The scores ranged from 10 to 1500 points and were indicated as the sum of all wetlands within the unit.

Eleven wetlands in the watershed can be classified as coastal units (Map 11L/6), (Canadian Wildlife Service, n.d.).

9.3 Ducks Unlimited Canada Management Sites

Ducks Unlimited Canada is active on Prince Edward Island in the enhancement and management of wildlife habitat. Several management techniques are employed for this purpose. Installation of water control devices such as drop inlets and stoplog control structures allow for the creation of ponds and the regulation of water levels in order to maintain optimal habitat conditions. Fishways are usually installed with the water level control structures in order to allow for the continued passage of fish into and out of the impoundment.

Three active Ducks Unlimited sites (Table 9.1), (Map 11L/6) are located in the watershed (Dibblee, 1989).

Table 9.1 Ducks Unlimited Canada Management Sites Located Within The Brackley — Covehead Bays Watershed Complex

NAME	SIZE (HA)	SHORELINE (KM)	YEAR COMPLETED
Cass Pond	6.2	N/A	1973
Covehead	4.9	1.0	1979
Marshalls Pond	2.5	N/A	1985

N/A - not available

10.0 ADDITIONAL ACTIVITIES WITHIN THE BRACKLEY - COVEHEAD BAYS WATERSHED COMPLEX

10.1 Hydrometric Stations / Water Chemistry Data

The first streamflow data collected in Prince Edward Island was from the Dunk River at Rogers Mill between 1919 and 1935. There are not any hydrometric stations in the Brackley - Covehead Bays Watershed Complex.

In addition, the Water Quality Branch, Inland Waters Directorate, Environment Canada, Moncton, New Brunswick also maintains somewhat limited data associated with the following studies:

- P.E.I. Groundwater Study (May 1972 - September 1973);
- P.E.I. Surface Water Quality Survey (July 1972);
- Water Quality Board National Water Quality Monitoring (April 1974 - March 1978); and the
- Toxic Chemical Survey (1985).

Parameters monitored included the following: major ions, physical parameters, nutrients, metals and toxic substances.

11.0 ACTIVITIES AFFECTING SURFACE WATER RESOURCES WITHIN THE BRACKLEY - COVEHEAD BAYS WATERSHED COMPLEX

Many of the problems affecting surface water resources occur as a result of the high erodibility of Island soils. soil erosion is accelerated by poor agricultural, forestry and road maintenance and construction practices. The problems affecting surface water resources on P.E.I. can be placed into three general categories; sedimentation (siltation) sources, pollution point sources and instream obstructions.

11.1 Sedimentation (Siltation) Sources

The entry of soil into surface waterways is described by the Watershed Inventory Project as a sedimentation (siltation) source. Autumn tillage, particularly plowing with the slope and cultivation excessively close to the streams' edge, often results in extensive landwash and siltation of the Island's waterways. Improper forestry operations, such as clearcutting on steep slopes and removal of greenbelts along streams and rivers also provides for sedimentation of streams and rivers.

One of the major sources of siltation to Island waterways is caused by the construction and maintenance of P.E.I. roads. Many roads on the Island are unpaved which presents numerous potential sources of sedimentation. Improper grading of these roads, in particular, leaving a ridge of clay and sand at

either edge allows runoff water to form channels resulting in erosion to the road surface. Water usually flows alongside these ridges until it "breaks" through, usually at a road-stream intersection. This practice of grading also renders ditches, if present, useless.

Silt-loading of Island streams and rivers does not usually affect the waterway at the point of entry but its effects are impacted further downstream. Soil particles are carried by currents and deposited in the stream covering essential finfish spawning areas. Shellfish beds in the estuaries are also affected in that they are smothered by silt.

11.1.1 Black River

The installation of a new box culvert at a road intersection with the Black River (Map 11I/6) is not stabilized with vegetation and constitutes a siltation source to the River.

11.1.2 Bells Creek

Regular maintenance of this unpaved road results in a siltation source at the Creek intersection (Map 11I/6).

11.1.3 Auld Creek

Stockwatering on Auld Creek (Map 11L/6) has destabilized streambanks and constitutes both a siltation and bacterial contamination source.

11.2 Pollution Point Sources

The entry of non-natural substances into a surface waterway is known as a pollution point source. For example, fertilizer and manure runoff into surface waterways results in bacterial and chemical contamination of the system. Inadequately or improperly treated human sewage, stormwater drainage and the discharge of industrial effluents also contribute to the deterioration of P.E.I.'s surface water quality.

The most recent examples of pollution point sources on the Island have been the entry of petroleum products, specifically gasoline, into streams, rivers and groundwater aquifers. This has resulted from either transportation accidents or leakage from underground storage tanks.

The result of bacterial contamination is usually the eutrophication of the aquatic system. As is the case with siltation, the effects of many pollution point sources are felt in downstream areas. This can result in the closure of

shellfish harvesting areas.

11.2.1 Marshalls Pond

Manure from a poultry operation is entering the upper bypass channel (Map 11L/6) of Marshalls Pond thereby constituting a bacterial contamination source.

11.2.2 Cass Pond

Cass Pond (Map 11L/6) is becoming choked with algae thereby suggesting a contamination or nutrient-loading source.

11.3 Instream Obstructions

Numerous other factors also influence the quality of the surface waterways within the Brackley - Covehead Bays Watershed Complex. Fallen trees or other debris in the streams and rivers present problems for fish passage. Improperly installed and unmaintained culverts, insufficient water flow and non-existent or inadequate dam bypass structures not only pose barriers to successful fish passage but also affect the amount of water available for use in downstream areas by other proponents.

11.3.1 Parsons Creek

A 0.75 metre steel culvert is raised about 0.35 metres above the Creek level on the downstream side. The lack of a plunge pool (less than 0.10 metres in depth) allows this road-stream intersection (Map 11L/6) to be a complete barrier to upstream fish migration.

11.3.2 Bells Creek

A build-up of natural debris in the Creek (Map 11L/6) may present problems for fish passage.

REFERENCES

Aitken, A., Department of Fisheries and Oceans, Charlottetown, written comm., 1989.

Canada Land Inventory, Soil Capability For Agriculture, 1968.

Canadian Wildlife Service, Wetlands Atlas of Prince Edward Island, n.d.

Clough, K., P.E.I. Department of Agriculture, Charlottetown, pers. comm., 1988.

Curley, K., Air and Solid Wastes Branch, P.E.I. Department of the Environment, Charlottetown, pers. comm., 1989.

Curley, K., Air and Solid Wastes Branch, P.E.I. Department of Community and Cultural Affairs, Charlottetown, pers. comm., 1988.

Dibblee, R., Biologist, Fish and Wildlife Branch, P.E.I. Department of the Environment, Charlottetown, pers. comm., 1989.

Dickieson, W., P.E.I. Department of Agriculture, Charlottetown, pers. comm., 1989.

Eaton, R., P.E.I. Department of the Environment, Charlottetown, pers. comm., 1989.

The Guardian - Patriot, September 1, 1988.

Hogan, S., Public Utilities Commission, Charlottetown, P.E.I., pers. comm., 1988.

Horne, F., S. Knudson, A. Rice and C. Roumbanis, 1988 Scenic Heritage Roads Program - Final Report, Island Nature Trust, Charlottetown, 1988.

Hurry, N., Fish and Wildlife Branch, P.E.I. Department of the Environment, Charlottetown, pers. comm., 1989.

Johnson, G., P.E.I. Department of Agriculture, Charlottetown, pers. comm., 1989.

MacLean, S., Director of Water Safety, Canadian Red Cross Society, Charlottetown, pers. comm., 1989.

McInnis, R., Department of Fisheries and Oceans, Charlottetown, pers. comm., 1989.

Murphy, C., Environmental Management Branch, P.E.I. Department of Community and Cultural Affairs, Charlottetown, pers. comm., 1989.

Murphy, L., Department of Fisheries and Oceans, Charlottetown, written comm., 1989.

Murphy, S., P.E.I. Department of Agriculture, Charlottetown, pers. comm., 1989.

Murphy, S., pers. comm., 1988.

Newson, J., P.E.I. Department of Agriculture, Charlottetown, pers. comm., 1989.

P.E.I. Department of Tourism and Parks, Angling on Prince Edward Island, Charlottetown, 1988.

P.E.I. Department of Tourism and Parks, Canoeing in Prince Edward Island, Charlottetown, n.d.

P.E.I. Department of Tourism and Parks, 1989 Visitors Guide, Charlottetown, 1989.

P.E.I. Development Agency, Marketing Division, Directory of Manufacturing and Processing, Charlottetown, 1986.

Pharo, C., Agriculture Canada, Charlottetown, pers. comm., 1989.

Quick, L., Municipal Council, Brackley - Covehead, P.E.I., pers. comm., 1989.

Small, D., Department of Fisheries and Oceans, Ellerslie, P.E.I., pers. comm., 1989.

Taylor, K., Inland Waters Directorate, Environment Canada, Dartmouth, N.S., pers. comm., 1989.

Water Resources Section, P.E.I. Department of Community and Cultural Affairs, Prince Edward Island Active and Abandoned Waste Disposal Site Survey - Phase I, Charlottetown, 1983.

APPENDIX

BRACKLEY-COVEHEAD BAY WATERSHED DAM INSPECTIONS

Millstream Pond (485100-5138800)

A 2.50 meter jump from the stream level to the Pond is a complete barrier for fish passage. There is an old water-powered saw mill at this location.

MacKay's Pond I (488700-5132300)

Not checked

MacKay's Pond II (488800-5132500)

Not checked

Bell's Creek I (487800-5134500)

A steel arched culvert with a wooden floor, located at this road-stream intersection does not create a problem for fish passage.

Bell's Creek II (489500-5136100)

There was no dam found at this location.

Harrington (487000-5133100)

A pond has been created by a driveway to a private home. There is a complete barrier for upstream passage by fish as the stream to pond level jump is quite high and the stream lacks a plunge pool.

MacMillan's Pond (487300-5137500)

A jump of approximately 2.0 meters from stream to spillway presents a complete barrier to upstream fish migration. As well, the wooden spillway does not contain sufficient water to support fish.

Cass' Pond (490300-5137600)

A 6-step pool and weir fishway with concrete spillway is located on this Pond.

Marshall's Pond I (490900-5137200)

A bypass channel leading from an upper pond presents no problems for fish passage.

Marshall's Pond II (490800-5137500)

A large steel arched culvert at road crossing leads to a bypass channel which exits Marshall's Pond. Fish can navigate this system without any problems.

Stanhope (490800-5138700)

Nothing found at this location.

Covehead Road (491300-5133500)

Small residential pond used for decorative purposes creates a complete barrier to fish passage near the headwaters of Auld Creek.

Parson's Creek (491500-5138600)

A 0.75 meter culvert is raised approximately 0.35 meters above stream level. A shallow plunge (less than 0.10 meters) makes successful fish passage difficult.